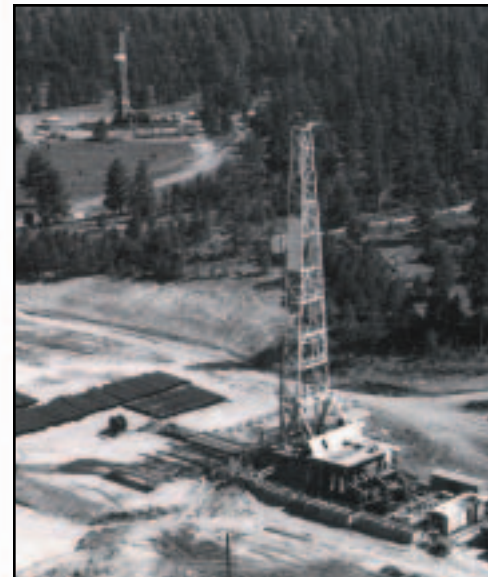


1967 GASBUGGY



In the Gasbuggy experiment, a part of Project Plowshare, a nuclear explosive was lowered down a 4,000-foot hole and detonated in a sandstone formation in New Mexico to increase natural gas production.

The Quest for Energy Resources

On December 10, 1967, under the technical direction of Livermore scientists, a 29-kiloton nuclear device exploded in a sandstone formation at a 4,000-foot depth in the San Juan basin of New Mexico. The experiment, Gasbuggy, was a joint venture of the Atomic Energy Commission, El Paso Natural Gas Company, and the Bureau of Mines of the U.S. Department of the Interior. It was the first of three Project Plowshare experiments, each partially funded by U.S. industry, to test the feasibility of using nuclear explosives to stimulate natural gas production in rock too impermeable for economical production by conventional means. Tight sandstone formations, like that in the San Juan basin, were projected to hold at least 300 trillion cubic feet of natural gas in the western United States.

The detonation produced an underground chimney 335 feet high with a diameter of almost 165 feet. Gas was extracted from the chimney in six subsequent major production tests (the last in 1973). Results were encouraging in that gas production was increased six to eight times over previous rates. However, the “clean” Plowshare device used in Gasbuggy, which was designed to minimize the post-detonation residual radiation, still resulted in undesirably high concentrations of tritium in the gas. Livermore’s device design was acceptably clean for the subsequent Rio Blanco experiment; however, the economic viability of using nuclear explosives to stimulate gas production proved to be problematic.

Gasbuggy and two subsequent gas-stimulation nuclear tests brought to a close Project Plowshare field experimentation, but they marked the beginning of Livermore’s work with U.S. industry to enhance conventional energy production. After the 1973 energy crisis, Laboratory researchers engaged in a variety of energy projects that culminated in large-scale demonstrations of technical feasibility and commercial viability. For example, processes for in situ coal gasification—converting coal beds to gas without mining—were developed. Activities ran from 1974 through 1988, with the first large-scale tests conducted at the Hoe Creek Site (Wyoming) in 1977. In addition, researchers pursued activities that led to technical demonstration of retorting oil shale to recover oil from large U.S. reserves. A 6-ton-capacity pilot oil-shale retort facility operated at the Laboratory in the early 1980s.

Currently, the Laboratory participates in the Department of Energy’s Natural Gas and Oil Technology Partnership, a national laboratory–petroleum industry alliance to expedite development of advanced technologies for better diagnostics, more efficient drilling, and improved natural gas and oil recovery. In one project, Livermore researchers have been improving the capability of crosswell electromagnetic imaging, a technology for monitoring the movement of water injected into wells to enhance oil recovery. Successful field experiments have been conducted at two sites, including the Lost Hills oil field operated by Chevron USA in central California.



The feasibility of underground coal gasification was demonstrated by the Laboratory in large-scale field experiments at the Rocky Mountain Test Facility (left) near Hanna, Wyoming, and earlier at the Hoe Creek Site in Gillette, Wyoming.